MSR57P Speed Monitoring Safety Relay (440R-S)

Allen-Bradley

Improve Productivity and Simplify Control System Operation, While Enhancing Operator Protection through guardlocking

Advantages

The MSR57P speed monitoring safety relay from Rockwell Automation is the first of its kind to allow personnel to safely enter hazardous areas while motion is present. It supports numerous input devices such as E-stops, safe speed selector switches, enabling switches and guardlocking switches to completely monitor the machine and the controls required to operate it. The MSR57P increases productivity by unlocking guard doors when zero speed is detected.

The speed of the motion is monitored by the MSR57P through the use of encoders. The relay supports single or dual encoder applications and monitors the signals from pre-installed encoders if available.

Drive explorer or a HIM device—the same tools required to program standard drives–are used to configure and monitor the status of the MSR57P.

Safe-Speed Functionality

Safe Stop (SS): Commands the machine to stop per the pre-configured stop category. This input places a request on the drive to stop the machine. If the machine does not stop within the configured time, a stop fault occurs to remove power to the drive.

Safe Limited Speed (SLS): When the speed of the machine is below a safe limit, the door(s) will be unlocked to provide access. If the speed exceeds this value while SLS is active, the system will react per the pre-configured stop category.

Enabling Switch Monitoring (ESM): Used in conjunction with SLS to permit motion only when the enabling switch is held in the middle position. Can be used to monitor personnel while in the machine area and motion is present.

Safe Maximum Speed (SMS): Limits the maximum speed the machine can run before a stop category is executed.

Safe Maximum Acceleration (SMA): Monitors acceleration of the machine and commands one of the stop categories when the pre-set limit has been exceeded. SMA can catch an over speed fault early if the machine begins accelerates exponentially from zero speed.

Safe Direction (SD): This configured parameter allows the user to select a "safe" operating direction for the machine. If the machine rotates in the opposite direction as configured, the pre-configured stop category will be executed.

Conditional Guardlocking Functionality

Door Control and Monitoring (DC and DM): Built in logic monitors and controls the door(s) to allow access only during safe conditions.

Zero Speed Monitoring: Once standstill has been detected, the MSR57P will unlock the door(s) to allow entry to machine.

Features:

A wide variety of on-board safe speed control functions

- Supports up to 2 encoders
- Cat 4 per EN954-1
- SIL CL3 IEC 61508 , PL e
- Stop Categories 0,1 and 2
- Enabling Switch Supported
- 6 N.O. Safety Outputs
- 4 Auxilary Outputs
- 8 Diagnostic LEDs
- DPI configuration port
- Removable terminals
- 67.5mm Enclosure

LISTEN. THINK. SOLVE.®

The MSR57P can be configured and monitored via PC with Drive Explorer or through the standard HIM device. During configuration, the user can set a variety of parameters to the specific requirements of their application including type of input devices, door locking and monitoring, enabling switches and desired safe speed functionality.

Single Axis Applications

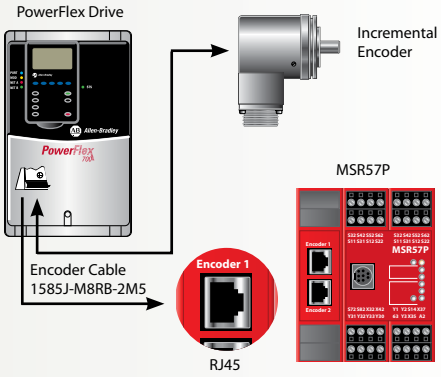
The MSR57P is ideal when a machine has a single source of motion yet access must be controlled to prevent personal injury or machine damage. Although it meets a variety of solutions, here are several of the most common.

Use Case #1

Simple assembly line with conveyor transporting material. The MSR57P ensures the line does not exceed a pre-configured value and does not change direction in normal run condition.

Functions
- Safe Stop
- Safe Direction
- SMS

SIN/COS and incremental encoders supported



Use Case #2

Simple web machine supplying material via a large roller for printing press. The MSR57P monitors the paper roll to ensure the material does not accelerate too quickly or spin faster than the support structure can handle. Personnel are not allowed to gain access to machine through multiple doors unless at safe speed.

Functions
- Safe Stop
- SLS, SMS
- DM, DC, LM

or

For Cat 4/SIL 3 apps with more than one door require SmartGuard or Guard I/O

Use Case #3

Status Only Mode - Adding Safe Speed monitoring with Safety Architecture System. MSR57P monitors speed and provide Safe Stop and Safe Limited Speed data discretely to Safety System for control.

Functions
- Safe Stop
- SLS Safe Direction
- SMS, SMA

Not required if connected to Safety I/O

PowerFlex 4, 4M, 40, 70, and 700S

Kinetix 2000, 3000, 6000, and 7000

Multi Axis Applications

The MSR57P also supports multiple axis applications. During configuration, it can be set up to be the first, middle or last axis in the chain. This is important since the safety component devices will all be installed on the first unit only while the output devices are connected to the last MSR57P in the chain.

The MSR57P can be configured and monitored via PC with Drive Explorer or through the standard HIM device. During configuration, the user can set a variety of parameters to the specific requirements of their application including type of input devices, quantity, door locking and monitoring, enabling switches and a intenance (safe speed) mode.

Use Case #6 SmartGuard or Guard I/O for cascading

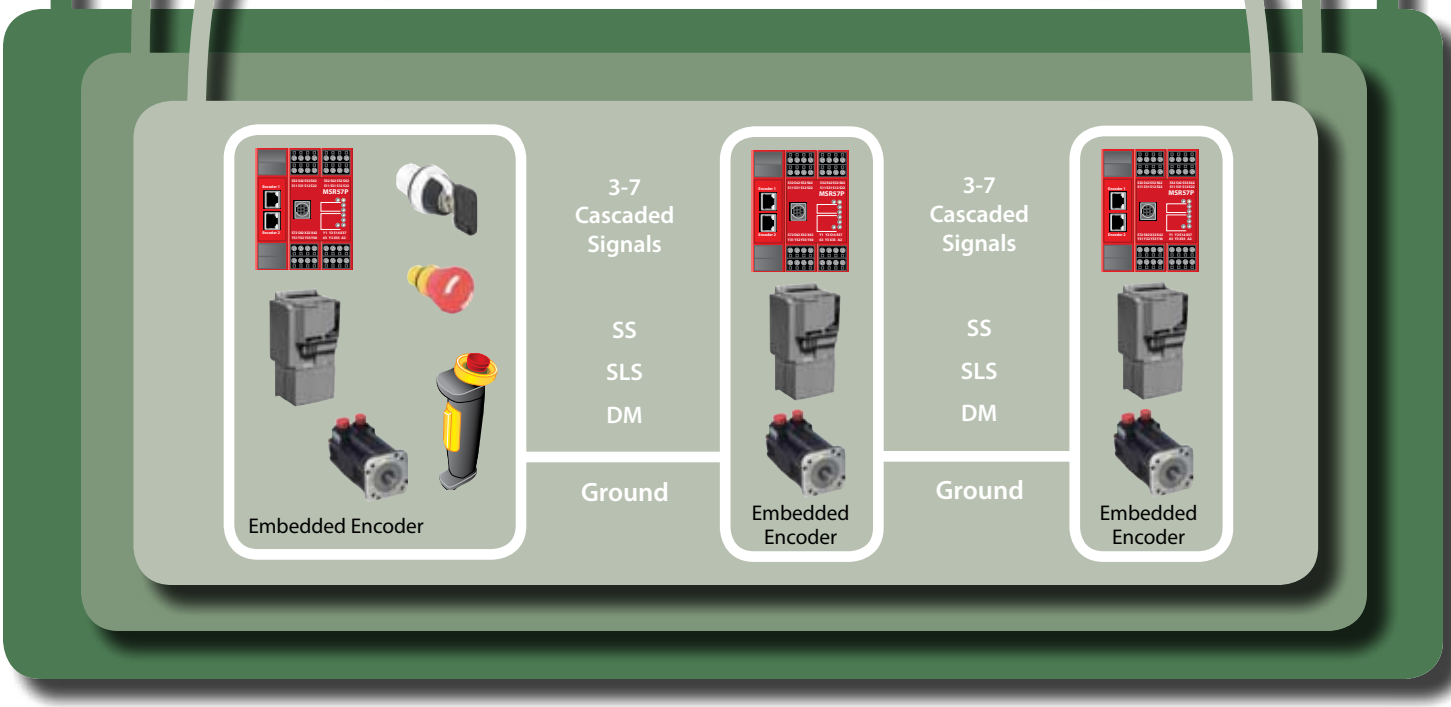
These will feedback the last unit in the MSR57P chain to the first commanding a safe stop condition if a middle unit faults. Also permits the Safety Architecture to Stop and reset the system.

Use Case #5 Multidoor

Up to three doors can be connected to the last MSR57P unit for Cat 3/ SIL CL2 systems to limit personnel access.

Use Case #4 Single Door

Interlock switch is locked by the last unit but monitored for door and lock status by the first unit. This is independent of the number of interlocks used Cat 4/SIL CL3.



Specifications

GuardMaster MSR57P Speed Monitoring Safety Relay – 440R-S845AER-NNL

Attribute	Value
Standards	IEC/EN60204-1, ISO12100, IEC 61800-5-2
Safety category	Cat. 4 and PL e per EN ISO 13849-1; SIL CL3 per IEC 61508 and EN 62061
Power supply	24V dc, 0.8…1.1 x rated voltage(3) PELV/SELV
Aggregate current of MSR57P	10.4A max. @ terminal A1 + 13
Power consumption	5 W
Outputs 14, 24, 68, 78	24V dc, 2 A, short-circuit protected
Outputs 34, 44	24V dc, 100 mA, short-circuit protected
Outputs Y35, Y37	24V dc, 50 mA, short-circuit protected
Door switches 51, 52(1)	24V dc, short-circuit protected • 1.5 A, bipolar (Power to Release/Power to Lock) configuration • 20 mA, cascading (2 Channel Source) configuration
Outputs Y32, Y33	24V dc, 100 mA, short-circuit protected
Output Y1	24V dc, 20 mA, short-circuit protected
Pulse outputs S11, S21	24V dc, 100 mA, short-circuit protected
Pulse inputs S12, S22, S32, S42, S52, S62, S72, S82, X32, X42	8.5 mA per input, max
Inputs S34, Y2	8.5 mA per input, max
Power-on delay, max	3 s
Response time	User-configurable.(4)
Pollution degree	2
Enclosure protection	IP40
Terminal protection	IP20
Wire Type	Use copper that will withstand 60/75 °C (140/167 °F)
Conductor size(2)	0.2…2.5 mm2 (12…24 AWG)
Terminal screw torque	0.6…0.8 Nm (5…7 lb-in)
Case material	Polyamide PA 6.6
Mounting	35 mm DIN rail
Weight, approx.	350 g (0.77 lb)

(1) For information on using these outputs in bipolar or cascading configurations, refer to the GuardMaster Speed Monitoring Safety Relay, publication 440R-UM004.
(2) Refer to Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1.
(3) Safety outputs need additional fuse for reverse voltage protection of the control circuit. Install a 6 A slow-blow or 10 A fast-acting fuse.
(4) Refer to the GuardMaster MSR57P Speed Monitoring Safety Relay User Manual, publication 440R-UM004 for details.

Featured Product:

	Description	Catalog No.
	MSR57P Speed Monitoring Safety Relay	440R-S845AER-NNL

Publication 440R-S-PP001A-EN-P - December 2008
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Safe Limited Speed and Safe Direction

Safe-Speed Control functions configured at setup using standardised approach independent of platform chosen.

Guard door locked. Operator selects access to machine via selector switch. Machine goes into Safe Limited Speed with Safe Direction mode.

Operator uses a 3 position enabling (grip) switch to control the safe limited speed of the motion while carrying out cleaning/ maintenance. Gripping or releasing the enabling (grip) switch will initiate a safe stop.

Description	Catalog No.
Shielded encoder cable - RJ45 to Flying leads (2.5m)	1585J-M8RB-2M5
3 meter cable HIM	1202-C30
1 meter cable HIM	1202-C10
AnaCANda USB converter	1203-USB
HIM full numeric LCD IP20 (NEMA 1)	20-HIM-A3
HIM to MSR 57 cable (1 meter)	20-HIM-H10
Incremental Encoders	845T***, 845H***
Sin/Cos Encoders	842HR***
Enabling switch	440J***
Guardlocking switches	440G***

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